NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER SAN DIEGO, CALIFORNIA 92152

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A COMPARISON OF THE JOB PERFORMANCE AND ATTITUDES OF CATEGORY IVs AND I–IIIs IN 16 NAVY RATINGS

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As an aid to the appropriate assignment of Category IV personnel to Navy ratings, this study was intended to provide objective data on the performance abilities of IVs in a representative sample of ratings.

Supervisory evaluations, biographical information, and attitude data were collected on samples of IV and non-IV personnel in 16 Navy enlisted ratings.

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20. ABSTRACT (continued)

Comparisons of IVs and non-IVs in each rating were made in terms of job performance, personal characteristics, and attitudes. t tests were used to identify the distinguishing characteristics of high performing IVs in five ratings. Multiple-regression analyses were used to investigate the predictability of performance of Category IVs in three ratings.

In the ratings covered, IVs exhibited generally widespread but small deficits in on-job performance when compared with non-IVs. Deficits in the global performance of IVs were generally statistically significant for the Boiler Technician, Machinery Repairman, and Quartermaster-Signalman ratings/rating groups. Test scores and educational attainment were associated with high on-job performance of IVs. There were few consistent differences in motivation and outlook between IVs and non-IVs.

FOREWORD

This research was performed in support of Exploratory Development Work Unit ZF55.521.030.01.01 (Prediction of Performance). It is one of a number of studies of the job performance characteristics of Mental Group IV personnel carried out in conjunction with Project 100,000.

This command is deeply appreciative of the cooperation in facilitating data collection for the study received from the Commanders and from staff personnel of the Naval Air Force, U. S. Pacific Fleet and the Naval Service Force, U. S. Pacific Fleet. The latter command has since become the Naval Logistics Command, U. S. Pacific Fleet.

J. J. CLARKIN
Commanding Officer

SUMMARY

Problem

Optimization of assignment of Mental Group IV personnel requires the matching of their ability characteristics with the ability requirements of individual ratings. Although the present input of IVs into the Navy enlisted service is lower than it has been in the past, Navy recruiting in the future may require larger numbers of IVs in order to fill manpower requirements. Comprehensive findings concerning the ability characteristics of IVs for Navy ratings have not been reported in past research.

Purpose

The objectives of the present study were: (1) to compare the job performance and attitudes of IVs and I-III controls in ratings to which IVs are assigned, (2) to identify characteristics which distinguish IVs with high on-job performance from those with low performance, and (3) to evaluate variables presently available early in recruit training as predictors of job performance of IVs.

Approach

Supervisory evaluations, biographical information, and attitude data were collected on samples of IV and non-IV personnel in 16 Navy enlisted ratings. For each rating, IVs and non-IVs were compared in terms of job performance, personal characteristics, and attitudes. For five of the nine ratings in which the mean performances of IVs were about the same as those of non-IVs, the distinguishing characteristics of high performing IVs were identified by means of *t*-test comparisons on nine test and biographical variables. Multiple-regression analyses were used to investigate the predictability of performance of IVs in the three ratings having the largest sample sizes.

Findings

1. When IVs and controls were compared on criterion variables, IVs exhibited consistent but relatively small deficits in performance. Overall, for the 16 ratings, I-IIIs were superior in terms of time

taken to learn the job, amount of supervision needed, confidence of supervisors in their work, and performance on-the-job. There were no significant differences between IVs and I-IIIs in the percentages of personnel who were doing all phases of the job.

2. For the following nine ratings the performance of Category IVs did not differ significantly from that of non-IVs on any of the criteria: Aviation Boatswain's Mate, Aviation Machinist's Mate, Commissaryman, Electrician's Mate, Engineman, Hull Technician, Ship's Serviceman, Storekeeper, and Yeoman.

3. Relatively minor significant deficits in performance of IVs occurred for Aviation Structural Mechanic, Boatswain's Mate, Gunner's Mate, and Machinist's Mate.

4. Major deficits in performance of IVs were observed for the Boiler Technician, Machinery Repairman, and Quartermaster-Signalman ratings/rating groups.

5. It is apparent that, for many ratings, some mental group IVs can be selected who will perform about as effectively as non-IVs. Within the IVs in the present study, those having the most potential for performing well in technical ratings tended to be characterized by relatively high scores on GCT, MECH, SHOP, and CLER, and to be high school graduates. However, these findings are tentative and the topic will be discussed further in a series of reports to be released shortly.

6. The findings suggest that to bring the average performance of IVs up to that of non-IVs, substantial additional screening would be necessary. If the screening were carried out by means of operational tests and biographical variables as in the present study, an additional 40 to 60 percent of the IVs would be rejected for assignments to Boatswain's Mate, Boiler Technician and Machinist's Mate, and, it is likely, to other technical ratings.

7. Few consistent differences in attitudes were found between IVs and I-IIIs. On the average, both IVs and controls in most of the ratings considered that their jobs were interesting and challenging, their supervision was pretty good or better, and their Navy jobs would <u>not</u> be helpful to them as civilians.

Recommendations

1. Since the performance levels of IVs tended to fall consistently below those of non-IVs, recruiting efforts should continue to focus on men in the higher mental categories (pp. 11-13).

2. In the following ratings, Category IVs performed adequately and about as well as non-IVs: Aviation Boatswain's Mate, Aviation Machinist's Mate, Commissaryman, Electrician's Mate, Engineman, Hull Technician, Ship's Serviceman, Storekeeper, and Yeoman. Therefore, it is suggested that selected IVs be used to fill future shortages of I-IIIs in these nine ratings.

Since the associated Class "A" schools provide enhancement of knowledge, earlier utilization on-the-job, and increased career opportunities, entrance of selected IVs into them, with adjusted waiver provisions, if necessary, should be considered. (pp.12-13).

3. It appears that Category IVs, in general, do not have the abilities necessary for performance as Quartermasters, Signalmen, Boiler Technicians, or Machinery Repairmen. They should be assigned to these ratings only if they appear to be exceptionally well qualified on the basis of previous experience. (pp. 12-13).

4. The relatively low predictability of global performance of IVs, even with biographical variables used to supplement the operational tests, indicates that better predictors of performance are needed. Efforts to develop such measures should be continued (pp. 21-22).

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INTRODUCTION

Research Connected with Project 100,000

Over the years, there has been considerable evidence, both empirical and subjective, that most personnel who scored low on the Navy's entry aptitude measures tended to be of correspondingly low value to the service. This evidence was principally embodied in the correlation between Basic Test Battery test scores and success in technical training (Class A schools). The lower the aptitude scores the poorer the school performance, and consequently the more limited the range of utilization, which resulted in generally lower performance ratings, advancement and percentages receiving recommendation for reenlistment. Personnel at the lower end of the aptitude scales were considered undesirable (the lower the score the less desirable), and the basic philosophy of recruiting was to reject lower aptitude personnel, or to accept only as many as were required to fill numerical manpower requirements.

At the same time an undercurrent of opposition to this tenet reflected a counter-belief that men low on the aptitude scale could, and should, be used more effectively and in greater numbers. This was expressed in the following terms:

1. Lower aptitude personnel possessed positive traits conducive to effective on-job performance, but these characteristics were not being tapped by the existing measuring instruments, which were fundamentally predictors of scholastic performance in Class A schools.

2. Therefore, lower aptitude personnel could have performed adequately on the job in many situations where they were not being utilized.

3. Ergo, if appropriate tests were used, i.e. measures of attributes related to on-job performance and geared to the abilities of the low aptitude personnel, these personnel could be accepted in greater numbers and used more flexibly and profitably.

This philosophy was given concrete embodiment in the establishment in the late 1960's of Project 100,000, under which each service was required to accept prescribed, and generally unprecedentedly high proportions of lower mental level personnel. This

project provided both an opportunity and an impetus for research into the philosophy of treatment of the lower mental level category personnel. More specifically, it provided a means for testing the hypothesis that this group could be usefully assessed by instruments tailored to its unique characteristics.

Although all services carried out a plethora of research under Project 100,000, the results were inconclusive and no definitive resolution in favor of either philosophy of utilization of lower mental level personnel was obtained. With the termination of Project 100,000 and a diminished interest in lower aptitude personnel as a unique group coupled with relatively favorable recruiting climates, research on the unique characteristics of lower mental level personnel has become a matter of secondary interest and effort. It is likely, however, that the problem of what to do about the lower level categories is a perpetual one, which will reappear time after time as conditions change. The data base used for the current report, collected during 1969 when Project 100,000 was underway, provides information which will be useful in any future emergence of the lower mental category problem as an active and immediate concern. Consequently, this report is issued as a matter of historical interest.

Performance Capabilities of Low Mental Level Personnel

Considerable anecdotal information is available among officer and enlisted administrative personnel in the Navy concerning the purported performance deficits of low mental level personnel for tasks above the level of general detail assignments. However, no large-scale objective survey of the performance capabilities of low mental level personnel for Navy rating assignments is reported in the literature. Since, in the future, as in the past, the Navy may have difficulties in recruiting sufficient numbers of personnel in the high mental categories, its effective operation may require that personnel in the lower mental categories be assigned to technical ratings. In that eventuality, objective information concerning the patterns of abilities of low mental category personnel for technical ratings will be very useful.

Of particular interest relative to the latter point are the performance characteristics of Category IVs, the lowest mental category of Navy enlisted personnel. Also of interest from this standpoint are the abilities of IVs who were permitted to enlist in the Navy after standards were lowered in the late 1960's under Project 100,000. For the purposes of this report, these personnel are called Lo-IVs. The Category IVs who meet the Navy enlistment standards formerly in effect are called Hi-IVs. Both of these mental groups were defined from scores on the Armed Forces Qualification Test (AFQT).

Evaluation Criteria

Two types of performance criteria presently used in the Navy are supervisory ratings and school grades. Within the operating commands the official supervisory rating of job performance (Report of Enlisted Performance Evaluation (NAVPERS-792)) has been the most important standard. It is officially considered in promotional, reenlistment, and other types of decisions. On the other hand, most Navy psychometric research has utilized school grades as a criterion, and the Navy classification battery has been developed to predict grades in Navy technical training. As a result, enlisted personnel are assigned to ratings largely on the basis of how well they are expected to perform in the appropriate "A" schools. In contrast, most formal personnel selection activities in state and local government and in private industry select individuals on the basis of their performance abilities on the job.

At the time of the study fewer than 2 percent of Category IV received assignment to "A" schools; instead, most IVs received on-the-job training in the Fleet for particular ratings. Therefore, job performance was the only relevant criterion to use for Category IVs. Two general types of job performance comparisons of IVs suggested themselves: (1) Comparisons with I-IIIs in the same rating to provide an estimate of general adequacy of abilities of IVs for particular ratings and (2) within-rating comparisons of high- and low-performing IVs to identify the distinguishing characteristics of high-performing IVs.

Purpose

The objectives of the present study were: (1) to compare the job performance and attitudes of IVs and I-III controls in technical ratings to which IVs are assigned, (2) to identify characteristics which distinguish IVs with high on-job performance from those with low performance, and (3) to evaluate variables presently available early in recruit training as predictors of job performance of IVs.

PROCEDURE

Sample

Data for strikers (apprentices training for a rating specialty) and rated men (personnel working in a specialty) were collected from commands homeported in San Diego, Long Beach, and San Francisco-Alameda. Mental level, as measured by AFQT, served as the independent variable, with the interest being in comparing IV and non-IV personnel who were similar in terms of type of duty and length of assignment. It was initially planned to select subjects in pairs, one member being a Category IV and the other, a non-IV. Both were to have equivalent job content and length of service, and were to be assigned to the same supervisor. However, because of the impossibility of securing matches in a number of cases, it was decided to discard the matched control design and to use a contrasted groups design to analyze the data available.

Data were not collected for the Steward (SD) rating since a large percentage of the personnel in the rating were Filipinos who, because of their different social and educational background, would not contribute useful data for comparing IVs and I-IIIs. Because of the small numbers of subjects in two closely related ratings, Quartermaster and Signalman, they were combined into a single rating group. Ratings with fewer than five IVs or five I-IIIs were dropped from the study.

The total sample contained 1,340 men, consisting of 778 IVs and 562 I-IIIs. Group Ns for the 16 ratings ranged from 17 to 403 men (Table 1), with the median being about 60. Most ratings had fewer controls than Category IVs.

About 1 percent of the IVs and 4 percent of the non-IVs had graduated from "A" schools. Generally, the "A" school attendance of IVs was approximately matched with that of non-IVs in the same rating. For 12 ratings, the number of IVs and non-IVs who were "A" school graduates was equal or the difference was not greater than one. Greater differences, all favoring non-IVs, were found in the following four ratings: SK (2), MM (2), BT (4), and MR (5).

Table 1

Ratings, Rating Abbreviations, and Subgroup
Ns for 16 Ratings

Rating	Rating Abbrev.	Total	Subgroup N	
			IV	Control
Aviation Boatswain's Mate	AB	62	34	28
Aviation Machinist's Mate	AD	34	21	13
Aviation Structural Mechanic	AM	17	12	5
Boatswain's Mate	BM	403	257	146
Boiler Technician	BT	161	90	71
Commissaryman	CS	64	45	19
Electrician's Mate	EM	36	12	24
Engineman	EN	55	26	29
Gunner's Mate	GM	57	34	23
Hull Technician	HT	97	54	43
Machinist's Mate	MM	168	100	68
Machinery Repairman	MR	29	11	18
Quartermaster-Signalman	QM-SM	19	8	11
Ship's Serviceman	SH	61	40	21
Storekeeper	SK	36	17	19
Yeoman	YN	41	17	24
TOTAL		1,340	778	562

Typically, 80 to 85 percent of the IVs never advance higher than apprenticeship ratings. Thus, the IVs in the study constituted a highly selected subgroup whose members had received assignments in technical ratings. In contrast, the competencies and abilities required for the ratings were presumably in the middle of the I-III range. The relatively unskilled apprenticeship ratings, as well as the most technical and demanding ratings (e.g., Electronics Technican and Fire Control Technician) were not included in the study.

Data Collection

Information for the study was gathered by a team of Chief Petty Officers using the following forms:

1. Supervisor Questionnaire (SQ)--a 32-item form, completed by the supervisor, containing questions about the subject's job assignment and performance.

2. Service Record Form--a 22-item form for recording biographical data, test scores, and the most recent supervisory ratings (report of Enlisted Performance Evaluation (NAVPERS-792)) of the subjects.

3. Attitude Questionnaire (AQ)--a 39-item form completed by the subject, describing his assignment and his attitudes toward the work situation, his associates, and the Navy.

The questionnaire forms are on file at NPRDC.

Supervisor Questionnaire forms were distributed to supervisors of the subjects. Several days later the completed forms were collected and checked. On that occasion, the Attitude Questionnaire was administered to the subjects.

Analyses

In a contrasted groups design, within rating means of IVs and controls on biographical, job performance, and attitudinal variables were tested for significant differences using *t* tests for uncorrelated means and, in some cases, the Wilcoxon test for matched pairs. For five ratings in which the mean performances of IVs were about the same as those of non-IVs, the distinguishing characteristics of high performing IVs were identified by means of *t* tests, which compared Hi- and Lo-IVs on nine test and biographical variables. Regression analyses using the accretion method of predictor selection were carried out to determine the variables which, in consort, were the most predictive of on-job performance of IVs in three ratings having substantial numbers of IVs: Boatswain's Mate, Machinist's Mate, and Boiler Technician. The practical effects of using regression analysis to improve the average level of performance of Category IVs were illustrated.

Variables

Thirty variables were selected for analysis--16 demographic and test score variables, 6 attitudinal variables, and 8 criterion variables. The demographic and test score variables were expressed in scales which were indigenous to their definitions--such as months on-the-job, paygrade levels, scores on classification tests, years of age, etc. In contrast, both the criterion and the attitudinal variables were formed by assigning interval scale values (i.e. 1, 2, 3, 4, etc.) to the ordinal response categories in which the questions had been originally phrased.

Demographic and Test Score Variables

1. Months under present supervisor--from the SQ.

2. Months in the Navy--from the AQ.

3. Months on the present job--from the AQ.

4. Black - non-Black (BL)--a binary variable coded "1" for a Black and "0" for a non-Black.

5. Score on Armed Forces Qualification Test (AFQT)--a composite score based on vocabulary, arithmetic reasoning, spatial reasoning, and tool knowledge.

6. Paygrade.

7. E-4 or above--a summary variable intended to approximate the proportion of rated personnel in a subgroup. It was determined by computing the z score for E-4 on the paygrade distribution for the sample, determining the area percentage equivalent of the z score for a normal distribution, and using that percentage as the estimate.

8. General Classification Test (GCT)--a measure of ability to comprehend and define words and to reason verbally.

9. Arithmetic Reasoning Test (ARI)--a measure of quantitative aptitude involving mathematical reasoning and problem solving.

10. Mechanical Test (MECH)--a measure of basic mechanical and electrical knowledge and comprehension of mechanical principles and relationships.

11. Clerical Test (CLER)--a measure of perceptual speed and accuracy which involves checking whether pairs of numbers are the same or different.

12. Shop Practices (SHOP)--a measure of knowledge of mechanical shop practices and the use of tools.

13. Foreign Language Aptitude Test (FLAT)--a measure of ability to learn foreign languages.

14. Hi-IV (HIV)--a binary variable coded "2" for a Hi-IV (AFQT scores of 21-30) and "1" for a Lo-IV (AFQT scores of 10-20).

15. Years of education (YRED).

16. High school graduation (HSGR)--a binary variable coded "1" for a high school graduate and "0" for a nongraduate. This variable was included to determine whether a predictive weight for high school graduation should be used in addition to, or instead of, YRED.

Variables 1 through 7 above were used for descriptive purposes. Variables 4 and 5 and 8 through 16 were used in the t test and regression analyses.

Criterion Variables

The first four criteria listed below are concerned with specific aspects of job performance, while variables 5 through 7 are global

estimates of the worth of the subject to the Navy. All attitudinal (see below) and criterion variables served as the primary dependent variables for the comparisons.

1. Subject's performance of all phases of his job--from the SQ. This is a positively-scaled, binary item.

2. Time required to learn job--from the SQ.

3. Amount of supervision required--from the SQ.

4. Supervisor's degree of confidence in man's work--from the SQ.

5. Supervisor's rating of man's overall performance (OVER)--from the SQ.

6. Supervisor's recommendation relative to the subject's reenlistment (REEN)--from the SQ.

7. Professional Performance (PROF)--the professional performance mark on the subject's most recent Report of Enlisted Performance Evaluation (NAVPERS-792).

Attitudinal Variables

The following seven variables were derived from subjects' answers to questions in the AQ. These variables, along with the criterion variables listed above, served as the primary dependent variables for the comparisons.

1. Perceived job challenge.

2. Interest in job.

3. Subject's opinion of the quality of Navy supervision.

4. Subject's opinion of transferability of Navy job to civilian life.

5. Subject's perception of his supervisor's evaluation of his work.

6. Subject's evaluation of his work.

7. (DIFF)--the difference between the supervisor's and the subject's global rating of his performance. Thus, a positive score on DIFF indicates that the man's rating of his performance was higher than that of his supervisor, while a negative score indicates the supervisor assigned the higher mark.

RESULTS

Comparisons of IVs and I-IIIs

Demographic Variables

Subgroup means for the first seven demographic variables, clustered by DoD rating group categories, are shown in Table 2.

For the ratings studied, the mean lengths of service in the Navy ranged from 13.5 to 28.3 months; mean lengths of time on the job, from 5.2 to 19 months; and mean lengths of time under the current supervisor, from 4.4 to 10.4 months. Thus, on the average, the men were in their first enlistment, had served long enough to become thoroughly familiar with Navy life and procedures, and had been on the job long enough to acquire considerable practice in performing its attendant tasks.

Despite the problems experienced in finding enough controls, the samples of IVs and controls were relatively well matched. Differences between IVs and non-IVs in "Months Under Present Supervisor" were usually less than a month and never greater than 3.2 months. However, greater differences occurred for "Months in the Navy" and "Months on the Job." Category IVs in the Storekeeper rating had spent several more months on the job than had the controls.[1] IVs had average paygrades of E-3 or above for only two ratings, compared with six ratings for the controls. For nearly all ratings, less than 10 percent of the subgroups were E-4 or above, regardless of mental level.

With one exception, Quartermaster-Signalman, the IV subgroups of all ratings had substantially greater percentages of Blacks than the control subgroups. In 13 ratings, Blacks comprised more than 14 percent of the IVs. On the other hand, there were no Blacks in the control subgroups for nine ratings, and Blacks comprised more

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[1]The subjective nature of data based on self-report may be seen in some of the temporal entries. Controls in Storekeeper and Aviation Boatswain's Mate ratings, and IVs in Electrician's Mate and Aviation Boatswain's Mate ratings actually reported longer mean lengths of time under their current supervisor than on the job. These differences were not great (all were less than a month) and appear to be a result of obtaining information from two different sources--both sources having fallible memories. Despite this shortcoming, these variables were useful for developing an understanding of the temporal characteristics of the groups.

Table 2

Means of IVs and Controls for Seven Demographic Variables

Variable	Group	Seamanship Specialists[a]		Admin. Specialists and Clerks		Electrical/Mechanical Equipment Repairmen								Craftsmen		Service and Supply-handlers	
		BM	QM-SM	SK	YN	AB	AD	AM	BT	EM	EN	GM	MM	HT	MR	CS	SH
1. Months under present supervisor	IV	5.5	6.8	6.5	4.6	9.1	6.4	6.2	7.4	10.4	7.8	6.8	8.0	7.2	8.5	5.9	4.7
	C	6.8*	6.2	5.3	4.4	8.7	5.9	7.4	8.6	7.2	6.5	8.3	9.5	7.0	7.7	6.6	5.0
2. Months in the Navy	IV	14.9	18.0	17.7	22.3	17.1	21.3	20.3	15.5	18.6	17.4	19.5	17.3	20.8	25.2	16.2	19.5
	C	20.9**	22.7	17.8	17.5	13.5	18.0	28.3	17.5	18.2	20.0	26.7	20.5	23.8	15.5	19.2	22.3
3. Months on the Job	IV	8.6	12.9	8.3	15.0	8.2	7.4	11.3	10.0	9.9	12.4	10.0	10.9	12.5	19.0	8.7	7.9
	C	10.6	12.9	5.2	6.2	7.4	8.1	13.7	11.4	10.2	9.4	12.9	11.8	11.9	10.1	8.1	9.3
4. Percentage of Blacks	IV	24.1	0.0	17.6	11.8	17.6	27.3	25.0	18.9	16.7	15.4	14.7	16.1	16.6	9.1[b]	17.8	19.5
	C	5.3	0.0	5.3[b]	0.0	0.0	0.0	20.0[b]	2.8[b]	0.0	0.0	0.0	2.9	0.0	0.0	5.3[b]	15.0
5. AFQT Score	IV	19.7	22.4	21.9	21.2	21.8	21.1	19.0	19.6	18.8	21.6	18.7	20.5	18.9	20.9	19.8	20.4
	C	56.0*	60.0**	56.8**	59.9**	57.2**	65.1**	67.2	60.6**	63.8**	57.2**	62.8**	60.5*	60.5**	69.9**	63.3**	49.6
6. Paygrade	IV	2.5	2.9	2.6	3.0	2.6	2.7	2.8	2.5	2.8	2.8	2.9	2.7	2.8	3.3	2.7	2.8
	C	2.8**	3.1	3.0	2.8	2.5	2.8	2.8	2.9**	2.8	3.1	3.2	2.9*	2.9	3.1	2.8	3.0
7. Percentage E4 or Above	IV	.4	4.0	4.7	7.9	.2	3.6	4.8	1.0	7.5	4.2	9.2	2.0	6.2	17.6	2.3	2.4
	C	.6	4.6	8.8	2.0	.2	4.5	7.6	1.7	.9	13.6	14.5	1.0	9.6	9.7	6.4	1.3
Subgroup *N*	IV	257	8	17	17	34	21	12	90	12	26	34	100	54	11	45	40
	C	146	11	19	24	28	13	5	71	24	29	23	68	43	18	19	21

Note. Differences between subgroup means for variables 4 and 7 were not tested for statistical significance.

[a]The complete title of this DOD occupational area, "Infantry, Gun Crews, and Seamanship Specialists," has been shortened for this report.

[b]This percentage is based on an N of 1.

*Significant at the .05 level.

**Significant at the .01 level.

than 14 percent of only two control subgroups. For several subgroups, these percentages were based on Ns of 1. Therefore, they should be viewed with caution.

Mean AFQT scores for IVs ranged from 18.7 to 22.4, with a median of about 20, indicating that Lo-IVs constituted about half of the group. Mean AFQT scores for the control subgroups ranged from 49.6 to 69.9. Navy classification test means for the IV and control rating subgroups are not presented in Table 2 because of the consistent and expected nature of their relationships, closely paralleling the AFQT findings. For all ratings control means were much--usually significantly--higher than the IV means.

Criterion Variables

Table 3 presents data comparing the performance of IVs and I-IIIs on seven criteria. For several ratings, differences of considerable magnitude were required in order to reach statistical significance because the Ns were quite small. T values for Wilcoxon matched pairs signed rank tests performed on the means of the 16 ratings are shown on the far right of Table 3. Because the Wilcoxon tests were used to determine the directionality and statistical significance of differences between IVs and controls, a one-tailed test was used. Levels of significance of the other statistics reported in Table 3 as well as in other tables in this report were based on two-tailed tests.

In general, for determining intergroup differences of practical significance, samples of the sizes used in the study provide substantial protection against Type II errors.[2] For most of the rating scales used, the power of the t test for detecting an intergroup difference of one rating point was greater than 40, 80, and 95 percent for sample sizes of 12, 17, and 34, respectively. Thus, protection against a Type II error was adequate for the 12 ratings having samples of 17 or more IVs. For the four ratings with sample sizes of fewer than 17, statistically significant differences were found in two, despite the small samples. The differences for the other two were obviously quite small.

Differences in the means for 18 of the 112 comparisons (16.1%) were statistically significant, and all such differences favored non-IVs. This percentage was somewhat greater than chance but was not a very substantial relationship overall. However, IVs had deficits for most of the criterion indices.

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[2] A Type II error is a failure to detect as statistically significant a significant intergroup difference.

Table 3

Means of IVs and Controls on Job Performance Characteristics

Question/Variable	Coded Response Category[a]	Grp	Seamanship Specialists[b]		Admin. Specialists and Clerks		Electrical/Mechanical Equipment Repairmen								Craftsmen		Service and Supply-handlers		Wilcoxen
			BM	QM-SM	SK	YN	AB	AD	AM	BT	EM	EN	GM	MM	HT	MR	CS	SH	T[c]
1. Does this man do all phases regarding his assigned job?	(1) No (2) Yes	IV	1.86	1.62	1.88	1.84	1.83	1.86	1.84	1.69	1.92	1.77	1.91	1.79	1.68	1.82	1.89	1.79	43
		C	1.87	2.00*	1.68	1.85	1.86	2.00	1.80	1.92*	1.88	1.86	1.96	1.84	1.70	1.72	1.85	1.91	
2. How long did it take this individual to learn his job compared to most Navy men?	(1) Longer (2) About same amount of time (3) Less time	IV	2.01	1.50	2.11	2.00	2.18	2.24	2.00	1.80	1.75	2.11	2.03	1.96	1.94	1.73	2.16	2.22	10.5**
		C	2.11	2.00*	2.11	2.17	2.25	2.17	2.60*	2.31**	1.96	2.21	2.30	2.16*	1.86	2.28*	2.37	2.19	
3. How much supervision does this individual need?	(2) Quite a bit (3) A moderate amount (4) Very little	IV	2.93	2.12	2.94	3.06	3.06	3.33	3.17	2.59	3.08	3.04	3.06	2.76	2.63	2.63	2.80	3.08	21.5**
		C	3.11	3.18**	2.79	3.04	3.21	3.38	3.40	3.37**	2.79	3.04	3.17	2.96	2.70	3.22	3.05	3.29	
4. How much confidence do you have in his work?	(2) Moderate amount if closely supervised (3) A moderate amount (4) A great amount	IV	2.84	2.00	2.83	3.06	2.97	3.33	2.92	2.39	2.75	3.00	3.00	2.75	2.68	2.82	2.98	3.13	11**
		C	2.95	3.27**	2.95	2.92	2.93	3.54	3.00	3.20**	3.00	3.00	3.44**	2.97	2.84	3.14	3.00	3.19	
5. OVER--Considering man's overall performance to date, in which group would he be placed?	(2) 21% - 40% (low) (3) 41% - 60% (4) 61% - 80% (5) Highest 20%	IV	3.25	3.00	3.59	3.65	3.44	3.67	3.42	2.93	3.25	3.40	3.34	3.22	3.00	2.73	3.44	3.23	16**
		C	3.49*	3.73	3.28	3.58	3.39	4.31	3.60	3.83**	3.17	3.57	3.74	3.50	3.21	3.67*	3.53	3.57	
6. REEN--What would you recommend concerning this individual's reenlistment?	(2) Marginally recommend (3) Recommend (4) Highly recommend	IV	2.65	2.50	2.94	3.12	2.85	3.05	2.58	2.47	2.67	3.00	2.97	2.64	2.72	2.55	3.02	2.90	1**
		C	2.74	3.27*	3.00	3.17	2.96	3.15	3.00	3.14**	2.87	3.04	3.26	2.92	2.81	3.33*	3.00	3.05	
7. PROF--Professional performance	(3.0- 3.2) Effective & reliable (3.4- 3.6) Highly effective & reliable	IV	3.29	3.12	3.62	3.50	3.41	3.38	3.36	3.29	3.22	3.42	3.44	3.26	3.27	3.46	3.38	3.41	23.5**
		C	3.36	3.43	3.44	3.40	3.51	3.49	3.60	3.38	3.33	3.46	3.52	3.29	3.45	3.45	3.48	3.48	
Subgroup N		IV	257	8	17	17	34	21	12	90	12	26	34	100	54	11	45	40	
		C	146	11	19	24	28	13	5	71	24	29	23	68	43	18	19	21	

Note. Data were available for all or nearly all subjects for every variable shown except PROF. About 60% of the men in the subgroups had marks on PROF. Thus, the means of the AM subgroups on PROF are very unreliable because they are based upon very small Ns.

[a]The response categories included in this table have been limited to those needed to illustrate the values of the means in terms of the categories of the questions. Scale values of the categories are shown in parentheses.

[b]The complete DoD title for this occupational area is "Infantry, Gun Crews, and Seamanship Specialists."

[c]Levels of significance for the Wilcoxen T are based on one-tailed tests. All other levels of significance in the table are based on 2-tailed tests.

*Significant at the .05 level of confidence.

**Significant at the .01 level of confidence.

Based on the Wilcoxon tests, the I-IIIs were judged superior in terms of time taken to learn the job, amount of supervision needed, supervisor's confidence in their work, and in overall performance on-the-job. There were no significant differences between IVs and I-IIIs in the percentages of personnel who were doing all phases of the job.

Both IVs and I-IIIs received average marks on the special performance ratings (OVER and REEN) which were lower than on the operational rating (PROF). In 13 ratings means of IVs on OVER were in the lower half of the distribution, compared with five ratings for controls. The REEN means for IVs in 12 ratings were below "Recommend", compared with five ratings for controls. In contrast, on PROF, Category IVs in 15 ratings and controls in all 16 ratings received average marks of "Effective" or better.

The finding that the men were rated higher on the operational criterion than on the special performance criteria is consistent with the findings of other researchers (Taylor & Wherry, 1951; Richards, 1959). The usual explanation for such findings has been that non-evaluative considerations, such as effects of the ratings on advancement, motivation, and morale, serve to distort performance evaluations in the operational setting. If this reasoning is correct, the special performance ratings are probably more representative of true performance than the operational rating.

Differences between IVs and controls in mean special performance marks in the Administrative Specialists and Clerks and Service and Supply-handlers areas were small and nonsignificant. Differences between these marks in ratings in the other three occupational areas were more variable.

Differences between IVs and controls were particularly pronounced for the Boiler Technican, Machinery Repairman, and Quartermaster-Signalman ratings. For these ratings, IVs generally required substantially more training and more supervision than controls and performed considerably less adequately on the job.

For Storekeeper, IVs received the higher marks, although their average paygrade was lower. Higher marks may be related to their substantially greater average length of time on the job, as noted in the Demographic Variables section.

Attitudinal Variables

To the extent that job performance is dependent upon mental ability, IVs are obviously at a disadvantage vis-a-vis controls. However, IVs could partially compensate for this disadvantage by displaying greater motivation and effort. It is well known that, in civilian life, IVs have fewer employment opportunities than I-IIIs. Thus, IVs might have greater motivation toward their Navy jobs than I-IIIs. However, the self-report attitudinal data in Table 4 do not show this to be the case. Differences between the means were statistically significant for eight of the 96 comparisons, representing a percentage of differences only slightly greater than would be expected by chance. There were few consistent differences in direction or level of the means of IVs in comparison with those of non-IVs.

The most important relationships shown in Table 4 are:

1. On the average, both IVs and controls in the majority of the ratings considered that their jobs were interesting and challenging, their supervision was at least pretty good, and their Navy jobs would not be helpful to them later in civilian life. Category IVs in the Electrical/Mechanical Equipment Repairmen area generally considered their jobs to be less of a challenge and less interesting than did their controls.

2. Ratings in Administrative Specialists and Clerks and Craftsman occupational areas were perceived by IVs to be of greater potential usefulness to themselves in civilian life than ratings in the other occupational areas.

3. The mean appraisals by IVs of the quality of their supervision were about the same as those of controls.

4. Category IVs in 14 ratings (versus controls in 16 ratings) considered the performance evaluations assigned to them by supervisors to be "pretty good" or better. The men's own evaluations of their performance were slightly higher, on the average. Both of these evaluations were substantially higher than the mean OVER evaluations actually assigned by supervisors (DIFF).

A comparison of the mean self- and supervisory evaluation marks of Blacks and Whites in the different mental levels can be made from Table 5. Both White and Black IVs consistently rated themselves higher on job performance than did their non-IV counterparts. Black IVs had higher mean self-ratings than White IVs ($p < .001$ by t test). On the other hand, supervisors rated both White and Black IVs lower than their non-IV counterparts. The relatively high average self-evaluation mark of Blacks supports recent findings which indicate that the low self-evaluations formerly

Table 4

Means of IVs and Controls for Seven Attitudinal Variables

Question/Variable	Coded Response Category[a]	Group	Seamanship Specialists		Admin. Specialists and Clerks		Electrical/Mechanical Equipment Repairmen								Craftsmen		Service and Supply-handlers	
			BM	QM-SM	YN	SK	AB	AD	AM	BT	EM	EN	GM	MM	HT	MR	CS	SH
1. Is your job a challenge?	(1) No	IV	1.24	1.62	1.40	1.58	1.10	1.37	1.57	1.39	1.67	1.61	1.23	1.41	1.66	1.70	1.58	1.30
	(2) Yes	C	1.27	1.67	1.69	1.44	1.44**	1.11	2.00	1.56	1.84	1.55	1.70**	1.64*	1.73	1.76	1.38	1.50
2. Is your job interesting?	(1) No	IV	1.23	1.38	1.70	1.50	1.24	1.37	1.57	1.36	1.78	1.87	1.52	1.47	1.66	1.90	1.76	1.62
	(2) Yes	C	1.25	1.89*	1.79	1.33	1.42	1.22	2.00	1.42	1.84	1.64	1.75	1.51	1.75	1.82	1.57	1.44
3. How good has your overall supervision been since you have been in the Navy?	(2) Fair	IV	3.06	2.62	3.90	3.25	2.60	2.75	3.57	2.86	3.44	3.00	3.30	2.65	3.18	3.40	3.60	3.24
	(3) Pretty good	C	2.92	2.89	3.47	3.45	3.00	3.33	4.33	3.15	3.06	2.82	2.85	2.85	2.88	3.18	2.94	2.72
	(4) Good																	
	(5) Very good																	
4. Do you think the Navy job you are doing will help you in civilian life?	(1) No	IV	1.18	1.12	1.80	1.50	1.05	1.37	1.43	1.24	1.89	1.74	1.00	1.32	1.70	1.70	1.52	1.24
	(2) Yes	C	1.15	1.11	1.58	1.33	1.26	1.33	1.33	1.44*	1.74	1.59	1.30**	1.38	1.63	1.82	1.47	1.39
5. How good a job does your boss think you are doing?	(2) Fair	IV	3.36	3.12	4.10	3.33	3.40	3.71	4.14	2.88	3.00	3.40	3.27	2.93	3.48	3.40	3.60	3.90
	(3) Pretty good	C	3.40	3.44	3.50	3.50	3.50	4.11	4.67	3.21	3.21	3.19	3.21	3.26	3.15	3.82	3.20	4.06
	(4) Good																	
	(5) Very good																	
6. How good a job do you think you are doing?	(2) Fair	IV	3.68	3.75	4.30	3.33	3.76	4.12	4.29	3.24	3.89	3.39	3.52	3.16	3.54	3.70	3.76	3.97
	(3) Pretty good	C	3.42*	3.78	3.47*	3.89	3.21	4.11	4.33	3.42	3.32	3.38	3.35	3.41	3.30	3.88	3.47	4.00
	(4) Good																	
	(5) Very good																	
7. DIFF (Ques. 6-Ques. 5 of Table 3)		IV	.43	.75	.65	-.26	.32	.45	.87	.31	.64	-.01	.18	-.06	.54	.97	.32	.74
		C	-.07	.05	-.11	.61	-.18	-.20	.73	-.41	.15	-.19	-.39	-.09	.09	.21	-.06	.43
Subgroup *N*		IV	257	8	17	17	34	21	12	90	12	26	34	100	54	11	45	40
		C	146	11	24	19	28	13	5	71	24	29	23	68	43	18	19	21

Note. Differences between subgroup means for Variable 7 were not tested for statistical significance.

[a]The response categories included in this table have been limited to those needed to illustrate the values of the means in terms of the categories of the questions. Scale values of the categories are shown in parentheses.

*Significant at the .05 level of confidence.

**Significant at the .01 level of confidence.

Table 5

Mean Self- and Supervisory Ratings of Global Job Performance

Rating Category	Black IV (N=151) Self Rating	Black IV (N=151) Supervisor's Rating (OVER)	Black IV (N=151) Difference	White IV (N=611)[a] Self Rating	White IV (N=611)[a] Supervisor's Rating (OVER)	White IV (N=611)[a] Difference	Black non-IV (N=19) Self Rating	Black non-IV (N=19) Supervisor's Rating (OVER)	Black non-IV (N=19) Difference	White non-IV (N=536)[a] Self Rating	White non-IV (N=536)[a] Supervisor's Rating (OVER)	White non-IV (N=536)[a] Difference
BM	3.87	3.06	.81	3.61	3.33	.28	3.62	3.13	.49	3.38	3.52	-.14
QM-SM	--	--	--	3.75	3.00	.75	--	--	--	3.78	3.73	.05
SK	3.33	4.00	-.67	3.37	3.46	-.09	--	--	--	3.88	3.41	.47
YN	4.50	4.50	.00	4.25	3.53	.72	--	--	--	3.47	3.58	-.11
AB	4.00	4.50	-.50	3.75	3.15	.60	--	--	--	3.21	3.39	-.18
AD	4.33	3.67	.66	3.75	3.79	-.04	--	--	--	4.25	4.33	-.08
AM	4.50	3.67	.83	4.20	3.33	.87	--	4.00	--	4.33	3.50	.83
BT	3.83	2.82	1.01	3.09	2.96	.13	3.00	4.00	-1.00	3.44	3.83	-.39
EM	3.00	3.00	.00	4.14	3.30	.84	--	--	--	3.32	3.17	.15
EN	4.50	3.67	.83	3.29	3.43	-.14	3.00	--	--	3.40	3.57	-.17
GM	4.00	3.60	.40	3.48	3.31	.17	--	--	--	3.35	3.74	-.39
MM	3.50	3.06	.44	3.13	3.20	-.07	4.00	3.50	.50	3.40	3.50	-.10
HT	3.73	2.66	1.07	3.49	3.07	.42	--	--	--	3.23	3.27	-.04
MR	4.00	3.00	1.00	3.67	2.70	.97	--	--	--	3.88	3.67	.21
CS	3.75	2.57	1.18	3.85	3.60	.25	4.00	2.00	2.00	3.43	3.61	-.18
SH	4.43	2.75	1.68	3.82	3.37	.45	4.33	3.00	1.33	3.93	3.71	.22
Mean	3.87[b]	3.11	.76	3.53[b]	3.21	.32	3.71	2.94	.76	3.46	3.54	-.08

[a]These columns were based only on data from personnel having Caucasian racial codes on the EMTR. Consequently, for several ratings, small numbers of non-Caucasian, non-Negroes were excluded who were included in the means for the same variables in Tables 3 and 4.

[b]A *t* test between these means was statistically significant at $p < .001$.

observed in Blacks are no longer characteristic of Blacks (See McDonald & Gynther, 1965; Wendland, 1967; White & Richmond, 1970). Similar research conducted prior to 1960--the beginning of concerted efforts to improve Blacks' self-image--almost universally found Blacks to have lower self-evaluations than Whites (Kardiner & Ovesey, 1951; Horowitz, 1939; Landreth & Johnson, 1953).

Thus, these data do not indicate that IVs are more Navy-job motivated than I-IIIs in similar types of positions. Of particular interest in this respect are the differences in expressions of interest and challenge favoring controls in Electrical/Mechanical Equipment Repairman ratings. Because of their present low rates of retention, and their consequent need for substantial replacement on a continuing basis, ratings in this occupational area are the most important ones to which IVs are assigned (Cory, 1971).

Characteristics of High Performing IVs

In a further investigation, the characteristics which distinguished high performing IVs in eight ratings were identified. For five ratings in which IVs were performing at about the same level as non-IVs, *t* tests were used for the comparisons. For the three ratings with relatively large numbers of IVs, the comparisons were carried out with a stepwise multiple-regression technique, using the accretion method.

Subgrouping for the *t*-test comparisons was carried out by splitting the IVs in a rating into high and low performers based on OVER. High performers were defined as those receiving a score of either 4 or 5 on OVER, and low performers as those receiving scores of 1, 2, or 3. Thus, high performers were those personnel rated by their supervisors as being in the upper 40 percent of their rate.

t-test Comparisons

Table 6 shows the means of high- and low-performing IVs on nine comparison variables available from the Enlisted Master Tape Record (EMTR).

Differences between the subgroups were significant at the .10 level or better for nine of the 45 comparisons, an incidence of significant differences twice as great as would be expected by chance alone. The following characteristics distinguished high-performing from low-performing IVs:

1. For Yeomen, high-performing IVs were much more likely to be high school graduates.

Table 6

Means of Test Scores and Biographical Characteristics of High and Low Performing IVs in Five Ratings

Comparison Variable	YN		SK		CS		EN		AB	
	High	Low	High	Low	High	Low	High	Low	High	Low
BL	.22	.00	.18	.17	.00***	.35	.14	.17	.32**	.00
HSGR	.89*	.50	.73	.83	.56	.50	.57	.83	.60	.50
AFQT	22.22	20.12	23.82*	18.33	20.96*	17.95	19.00	19.44	22.05	21.50
GCT	46.44	40.88	47.82**	37.67	38.09	39.55	40.57	38.83	40.10	42.21
ARI	46.66	44.75	45.54	43.83	40.52*	43.75	42.43	38.58	40.30	42.00
MECH	42.11	43.50	41.55*	46.17	42.52	39.15	45.50	44.00	45.80	47.07
CLER	48.67	53.38	51.82*	43.50	44.74	45.00	45.14	50.17	42.95	40.07
SHOP	47.11	48.38	42.36	43.00	45.17	43.00	46.71	48.08	44.60	47.07
FLAT	5.71	2.00	5.88	5.80	2.07	3.46	1.36	3.28	2.86	5.00
N	9	8	11	6	23	20	14	12	20	14

*$p < .10$.
**$p < .05$.
***$p < .01$.

2. For Storekeepers, high-performing IVs had higher general intelligence and verbal and perceptual speed abilities. The significant intergroup difference on MECH was probably a chance variation.

3. The fact that no Black IVs received high ratings for Commissaryman suggests that race was a factor in perception of performance of these personnel. The opposite direction of the significant differences of AFQT and ARI, two highly intercorrelated variables, suggests that these resulted from chance fluctuations rather than distinguishing characteristics between subgroups.

4. None of the variables distinguished the high-performing IVs in the Engineman rating.

5. The only distinguishing characteristic of the high-performing Aviation Boatswain's Mate IVs was that they were more likely to be Blacks than were the low-performing IVs. All Black IVs in the Aviation Boatswain's Mate subsample received high performance marks.

Predictor Selection by Multiple Regression

The usefulness of a multiple-regression technique to select the better performing Category IVs was investigated for the Boatswain's Mate, Machinist's Mate, and Boiler Technician ratings. For this purpose, an intercorrelation matrix was formed for each rating.

Predictor-criterion Intercorrelations. The means, standard deviations, and intercorrelations among 14 predictor and criterion variables for the Boatswain's Mate rating are shown in Table 7. These relationships were similar to and representative of statistics for Machinist's Mates and Boiler Technicians for the same variables.

Means and standard deviations of IVs on nearly all of the operational tests were much lower than those previously computed for samples of typical Navy enlisted personnel. For example, the standard deviation of AFQT for IVs in the present study was about 25 percent of that of a full-range recruit population, and the standard deviation of the two most important classification tests, ARI and GCT, were from 60 to 70 percent of the values usually found for typical recruit input.

Similarly, intercorrelations of AFQT, GCT, and ARI were in the .30s and .40s, as compared to the correlations in the .60s and .70s, which are typical of unrestricted samples of Navy enlisted personnel. For the other tests in the operational battery, deficits in the r's in the present study were even greater. These low intercorrelations undoubtedly resulted from restricting the range of AFQT scores in the sample.

Table 7

Intercorrelations, Means, and Standard Deviations for Seven Operational Test, Four Biographical, and Three Global Criterion Variables for Boatswain's Mate IVs

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Mean	S.D.	N
1. GCT	---	43**	-01	09	26**	29**	37**	23**	19**	-04	06	-14*	42**	06	39.42	7.64	257
2. ARI		---	01	16*	13**	43**	38**	20**	18**	-13*	13*	13*	38**	14*	42.07	5.96	257
3. MECH			---	09	42**	-03	08	-11	-10	-23*	03	04	15*	16*	41.73	6.13	257
4. CLER				---	04	24**	10	23**	27**	-09	15*	20**	11	20**	45.55	9.86	257
5. SHOP					---	07	19**	06	03	-22**	05	13*	25**	07	43.03	6.41	257
6. FLAT						---	34**	19**	24**	-04	08	10	29**	-00	3.16	3.83	200
7. HIV							---	16*	18**	-05	21**	25**	88**	19**	1.40	.49	255
8. YRED								---	82**	06	16*	23**	12	19**	11.24	1.43	257
9. HSGR									---	02	14*	21**	10	24**	.68	.47	257
10. BL										---	-10	-02	-07	-10	.24	.43	256
11. OVER											---	75**	19**	38**	3.25	1.09	254
12. REEN												---	25**	36**	2.35	1.03	254
13. AFQT													---	24**	19.74	5.76	257
14. PROF														---	32.89	3.34	158

Note. -Decimal points have been omitted from correlation coefficients.

*Significant at the .05 level.

**Significant at the .01 level.

As shown by the correlations of HIV, the means of Hi-IVs on all three global criteria were considerably higher than those for Lo-IVs. Correlations for BL show that Blacks were rated slightly lower on the global criteria than non-Blacks.

The correlation between the two special performance measures (OVER and REEN) was .75. In a previous study, reliability coefficients for OVER and REEN computed on a sample of 236 enlisted men retested after a 4-week interval were .66 and .70, respectively. The fact that the correlation of the two special marks was about the same as their reliabilities suggests that these marks were measuring a single dimension.

Regression Analyses. Predictors which added to the estimates of cross-validation *R*s for global criteria for the three ratings are shown in Table 8.

Several important relationships in the table are:

1. Estimates of cross-validated correlations with job performance ranged from .14 to .34 for OVER, .00 to .30 for REEN, and .22 to .30 for PROF.[3] (Weight-development *R*s generally were from 5 to 10 points higher than the cross-validation estimates.)

2. Performance marks for Boatswain's Mate and Machinist's Mate were considerably more predictable than those for Boiler Technician.

3. About half of the predictors selected were scores on the classification battery and consequently are available early in recruit training. The rest were biographical and test variables which are available at the time of enlistment. Particularly important among the latter are Hi-IV, Years of Education, and High School Graduation. The latter two variables have been found to be important for the prediction of retention of Air Force enlisted men (Flyer, 1959; Gordon & Flyer, 1962).

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[3] FLAT, as used in predicting the PROF criterion for Boatswain's Mate, apparently acted as a suppressor variable (Horst, 1966). Its high-to-moderate positive correlations with CLER and HSGR, two other predictors selected, and its zero correlation with the criterion gave it the role in the prediction equation of suppressing the variances of CLER and HSGR, which are independent of the tests' covariances with the criterion.

Table 8

Predictors Incrementing the Estimate of Cross-validated Correlation Coefficient for Global Criteria for Three Ratings

	MM Rating				BT Rating				BM Rating			
Criterion	Predictor	R	Estimated Cross-val. R	Beta Wt.	Predictor	R	Estimated Cross-val. R	Beta Wt.	Predictor	R	Estimated Cross-val. R	Beta Wt.
OVER	GCT	38	33	3158	MECH	22	07	2259	HIV	21	16	1721
	AFQT	41	34	1742	CLER	29	14	1916	CLER	24	19	1012
									YRED	27	20	1153
REEN	SHOP	28	21	2192	HIV	19	0	2146	AFQT	25	22	2141
	GCT	36	25	2070					YRED	32	29	1333
	HSGR	38	26	1472					CLER	35	30	1332
PROF	YRED	29	13	3092	HIV	34	22	3435	HSGR	24	19	2326
	SHOP	42	29	3050					AFQT	32	26	2202
									MECH	36	28	1302
									CLER	37	28	1358
									FLAT	40	30	-1479
N	99				88				254			

Note. Decimal points have been eliminated from the correlation coefficients and the beta weights.

Nearly complete data were available for all variables except PROF and FLAT, for which data were present in about 60 percent and 65-80 percent of the cases, respectively.

Selection effects of different score cutoffs on Category IV personnel. The usefulness of the predictor batteries shown in Table 8 for improving the average quality of IVs selected was also investigated. To do so, each individual's scores on the predictors selected for each criterion, weighted by their beta weights for the criterion, were summed to form a composite score. These scores were formed into an array, and a cutoff was applied to screen lower-scoring personnel. The mean criterion mark of the remaining personnel was computed.

The potential effects of the use of these variables for screening are shown in Table 9, which provides statistics and indices for four different cutoffs for the criteria. In brief, Table 9 indicates:

1. For Machinist's Mate and Boatswain's Mate, using any of the three criteria, it was possible to increase the mean quality of IVs to equal that of controls. However, for most of the criteria, increases in the average quality of IVs were associated with smaller percentages of Lo-IVs and Blacks in the selected subgroup than in the original subgroup.

2. For Boiler Technician, it was not possible to equate the OVER and REEN means of IVs and controls for any of the subgroups. Thus, the OVER and REEN means of IVs and non-IVs could not be equated, even after the comparisons were restricted to the best 35 to 48 percent of the IVs. On PROF, the IV mean could be equated with that of non-IVs by using a selection ratio of .40. However, the selected subgroup would not have any Lo-IVs.

The findings in Table 9 suggest that the average quality of IVs in many ratings may be raised to equal that of non-IVs. However, to do so by means of the variables shown in Table 9 would result in the selected subgroups having somewhat smaller percentages of Lo-IVs and Blacks than were present in the original subgroups.

Table 9

Mean Performance of IVs and Percentages of Lo-IV and Black-IV Subgroups Selected Using Four Different Cutting Scores for Each Predictor Composite

Criterion	% of IVs Selected	Mean of Controls	Mean of IV Subgroup[a]	*N* of IV Subgroup	% of Original Lo-IVs Selected	% of Original Black IVs Selected	% of Lo-IVs in the Selected Subgroup	% of Black IVs in the Selected Subgroup
				Machinist's Mate				
OVER	100	3.50	3.22	99	100	100	55	16
	84		3.37	83	40	78	48	15
	64		3.56←	64	27	56	42	14
	54		3.65	54	19	56	35	17
REEN	100	2.92	2.64	99	100	100	55	16
	83		2.73	82	41	62	50	12
	62		2.88	61	32	31	52	8
	49		2.98←	49	22	31	45	10
PROF	100	3.29	3.26	99	100	100	55	16
	84		3.28	83	44	67	53	13
	63		3.30←	62	34	43	55	11
	47		3.33	47	25	18	50	6
				Boiler Technician				
OVER	100	3.83	2.93	90	100	100	60	19
	83		2.99	75	46	71	55	16
	55		3.26	50	29	47	52	16
	48		3.30	43	24	18	54	7
REEN	100	3.14	2.47	90	100	100	60	19
	55		2.46	50	35	56	62	19
	43		2.38	39	23	43	54	21
	35		2.45	31	14	34	45	19
PROF	100	3.38	3.29	90	100	100	60	19
	98		3.28	89	59	89	60	17
	40		3.38←	36	0	47	0	22
	40		3.38	36	0	47	0	22
				Boatswain's Mate				
OVER	100	3.49	3.25	257	100	100	60	24
	87		3.31	226	47	73	54	20
	59		3.45	153	22	34	37	14
	48		3.54←	124	12	31	25	15
REEN	100	2.74	2.65	257	100	100	60	24
	76		2.76←	207	42	73	52	22
	64		2.88	160	25	52	40	20
	52		3.01	134	17	43	32	20
PROF	100	3.36	3.29	257	100	100	60	24
	67		3.31	174	48	51	59	18
	48		3.38←	124	23	40	48	20
	38		3.42	100	16	31	40	19

[a]Means of selected IV subgroups ≥ means of Controls are indicated by an ←.

DISCUSSION

The results of the study are not generalizable to all Mental Group IVs, but rather, only to the small percentage who strike for technical ratings. Similarly, the findings relative to I-IIIs are best interpreted as being characteristic of I-IIIs, without A-school training, who strike for these 16 ratings.

Mean Performance Levels

1. Generally, the highly selected group of IVs showed consistent but small deficits in performance when compared with controls. Overall, for the 16 ratings, I-IIIs were superior in terms of time taken to learn the job, amount of supervision needed, confidence of supervisors in their work, and in performance on-the-job. There were no significant differences between IVs and I-IIIs in the percentages of personnel who were doing all phases of the job.

2. For the following nine ratings, the performance of Category IVs did not differ significantly from that of non-IVs on any of the criteria: Aviation Boatswain's Mate, Aviation Machinist's Mate, Commissaryman, Electrician's Mate, Engineman, Hull Technician, Ship's Serviceman, Storekeeper, and Yeoman.

3. Relatively minor significant deficits in performance of IVs occurred for Aviation Structural Mechanic, Boatswain's Mate, Gunner's Mate, and Machinist's Mate.

4. Major deficits in performance of IVs were observed for the Boiler Technician, Machinery Repairman, and Quartermaster-Signalman ratings/rating groups.

5. The contrast between the general levels of global performance of IVs versus I-IIIs was greater for the special performance marks than for the operational mark (NAVPERS-792). This suggests that the NAVPERS-792 mark may have understated the deficiencies of IVs in on-job performance.

6. It is apparent that, for many ratings, some Mental Group IVs can be selected who will perform about as effectively as non-IVs. Within the IVs in the present study, those having the most potential for performing well in technical ratings tended to be characterized by relatively high scores on GCT, MECH, SHOP, and CLER, and to be high school graduates. However, these findings are tentative and this topic will be discussed further in a series of reports to be released shortly.

Attitudes and Motivation

Few consistent differences in attitudes were found between IVs and I-IIIs. In most ratings, on the average, both IVs and controls considered that their jobs were interesting and challenging, their supervision was pretty good or better, and their Navy jobs would not be helpful to them as civilians.

Predictability of Performance

In three ratings, using variables available operationally as predictors, the estimated cross-validated *R*s for global criteria were about .25 to .30. Both years of education and the binary high school graduation/nongraduation variable improved the predictability available from classification tests--sometimes substantially. Predictabilities of the special supervisory marks were not much different from that of the NAVPERS-792 mark.

Effects of Improved Screening on Performance

Even for the highly selected samples used for the present study, much higher percentages of IVs would need to be screened to equate the average performance of the remaining IVs to that of I-IIIs. If the screening battery were restricted to classification tests, an anticipated additional 40 to 60 percent of the IVs would be screened from many technical ratings. If both classification tests and biographical variables were used, somewhat smaller percentages of IVs would be screened.

RECOMMENDATIONS

The following recommendations are made:

1. Since the performance levels of IVs tended to fall consistently below those of non-IVs, recruiting efforts should continue to focus on men in the higher mental categories.

2. In the following ratings, Category IVs performed adequately and about as well as non-IVs: Aviation Boatswain's Mate, Aviation Machinist's Mate, Commissaryman, Electrician's Mate, Engineman, Hull Technician, Ship's Serviceman, Storekeeper, and Yeoman. Therefore, it is suggested that future shortages in these nine ratings be filled with selected Mental Group IVs.

Since the associated Class "A" schools provide enhancement of knowledge, earlier utilization on-the-job, and increased career opportunities, entrance of selected IVs into them, with adjusted waiver provisions, if necessary, should be considered.

3. It appears that Category IVs, in general, do <u>not</u> have the abilities necessary for performance as Quartermasters, Signalmen, Boiler Technicians, or Machinery Repairmen. Thus, they should be assigned to these ratings <u>only</u> if they appear to be exceptionally well qualified on the basis of previous experience.

4. The relatively low predictability of global performance of IVs, even with biographical variables used to supplement the operational tests, indicates that better predictors of performance are needed. Efforts to develop such measures should be continued.

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